



JOHNE'S DISEASE

A Guide for Producers and Veterinarians

South Dakota Animal Industry Board

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BUYING BREEDING STOCK?

It is important to note up front that the most common way of introducing Johne's Disease into your herd is through purchased cattle additions.

Asking pertinent questions before buying is good disease control (biosecurity) and good business.

Logic would certainly suggest:

- Purchasing from herds with a Johne's Disease Status Level reduces risk.
- Purchasing from herds doing testing and management for Johne's Disease would provide less risk than from "maximum risk" herds with no management, no testing history, no status, and possibly little awareness of Johne's Disease.

For More Information, check out our website at:

www.state.sd.us/aib/

www.state.sd.us/aib/forms.htm

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What is Johne's Disease?

- Pronounced “Yo-nees”.
- Also called Paratuberculosis.
- A **chronic** (months to years) infection causing intermittent to continuous **diarrhea and wasting**.
- Found in cattle usually over **two years** of age.
- Also a disease of sheep, goats and other ruminant animals.

What causes Johne's Disease?

- “*Mycobacterium avium* subspecies *paratuberculosis*” (M.A.P.) - a bacteria closely related to the organism responsible for TB (tuberculosis).
- This is a very **slow growing** bacterial organism requiring three to four months to grow even under ideal laboratory conditions.
- Dr. Heinrich Albert Johne discovered this organism in 1895.

What are the signs of Johne's Disease in cattle?

- Cattle are usually **two** years old and **older** when signs of the disease occur (even though **infection** usually **occurs as a calf** less than 6 months of age or even prior to birth).
- Diarrhea, weight loss, normal appetite, normal appearance otherwise.
- As the disease progresses over several weeks to months, **severe diarrhea**, **wasting** away of flesh, literally “starved appearance”.

Where does Johne's come from?

- Fecal contamination of water and feed from shedding animals is a source of the bacteria and thus spread to other adult animals cannot be ignored.
- M.A.P. is a very “tough” bacteria capable of surviving weeks to months in **soil or manure** under the right conditions.
- Milk and colostrum may contain the organism: Calves **nursing infected dams** are at risk, **and contamination** of udders and environment **with manure** are major sources of infection. The organism can be **shed** profusely **in the manure** of infected cattle.
- Infection of the fetus in the uterus of an infected cow may occur in as many as 25% of cases.

How does Johne's Disease develop?

- After ingestion of the bacteria the organism grows slowly in the wall of the intestine. Thickening and inflammation of the intestine occurs. This causes failure to absorb nutrients, hyperactivity of the intestine, and loss of nutrients (from leaking of proteins) and electrolytes from the body into the diarrhea fluid

How long is the incubation period for Johne's Disease?

- Several months to several years (Chronic).
- **Calves** (especially newborn) and younger cattle are **most susceptible** to infection.
- Johne's Disease is usually not recognized in an animal until two years of age or older.
- Factors affecting the length of the incubation period include:
 - extent of exposure due to degree of contamination of environment by animals shedding the paratuberculosis organism.
 - nutrient status of animals.
 - general quality of husbandry in the herd.
 - stress of production and handling, i.e. breeding, milking, crowding, shipping, weather, other disease, etc.

What breeds or types of animals does Johne's effect?

- All **ruminant animals** seem to be susceptible.
- **Dairy** cattle seem to be affected more than beef (probably due to husbandry).
- Beef cattle are also affected.
- Other ruminants such as sheep and elk.

Is Johne's Disease a new disease?

- No - it has been recognized for many years (since 1895).
- Johne's Disease does seem to be increasing both in number of herds affected and also in number of cattle affected within herds

How do I know if I have Johne's Disease in my herd?

- **Clinical Diagnosis:** Cows or bulls showing signs of **chronic diarrhea**, continuing to eat, slowly wasting away.
- **Laboratory Diagnosis:** Confirm the disease by consulting your veterinarian and taking appropriate samples.

Is there a good vaccine for Johne's Disease?

- **No.** The commercially available vaccines do not protect against infection, but reduce clinical signs. The vaccine interferes with testing and management programs.

What are the laboratory tests?

The table below lists various tests used for the identification of M.A.P.-infected animals. The sensitivity of the tests are limited due to the nature of the disease which includes a slow growing bacteria, extremely long incubation period, intermittent shedding of the organism in the feces and a delayed immune response of the affected animal. To increase the probability of identifying infected animals and verify the “specificity” of a test (verify if a “false positive” reaction occurred) obtaining results from more than 1 test over time is advisable.

	<u>Test</u>	<u>Advantage</u>	<u>Disadvantage</u>
Blood Tests	ELISA (Enzyme-Linked Immunosorbent Assay)	High specificity Inexpensive, fast. Ideal for use as a screening test. <u>More sensitive than the AGID or CF antibody tests.</u>	Sensitivity is limited due to a very delayed immune response of the animal (may not develop antibodies until 2 years after infection).
	AGID (Agar-gel Immunodiffusion)	95% Specific (Low rate of “false positives”) Correlates well with animals showing clinical signs.	Poor Sensitivity. May not detect some animals which are shedding the organism, but not yet showing diarrhea, weight loss, and other typical signs of Johne’s Disease.
	CF (Complement Fixation)	Used for import/export purposes.	Poor sensitivity, false negatives, false positives.
Fecal Tests	Fecal Culture	Most sensitive and specific test.	12-16 weeks to get results. Requires that viable bacteria are present for growth. Some strains of the bacteria from non-bovine species may not grow on standard culture media..
	BACTEC Culture	More sensitive and faster (8 weeks) than standard culture.	More expensive than standard culture. Requires that viable bacteria are present for growth.
	DNA Probe (PCR)	Specific, fast, useful for early detection (can detect DNA of the organism prior to an antibody response.	Expensive, not sensitive for animals shedding small numbers of the organism.

What are the costs of Johne’s Disease in my herd?

- loss of animals due to death or early culling.
- decreased milk production by affected cows.
- decreased slaughter weight on salvageable animals.
- loss of valuable animals for show, sale, breeding.
- veterinary costs for diagnosis and treatment.

Are there Laws regulating Johne's Disease?

- No - other than as with any other disease - affected animals are not eligible to be sold other than for slaughter.
- Reportable Disease – all positive test results are reportable to the Animal Industry Board.
- Johne's Disease is not a quarantinable disease.

How do I control or eliminate Johne's Disease?

- Discuss strategies with your veterinarian.
 - evaluate the extent of infection (it is estimated that for every animal showing signs there may be an additional **15 to 25 infected** animals in a given herd).
 - set up plan to identify infected animals by testing.
 - determine the best practices to reduce fecal contamination of feed and water.
 - monitor progress of efforts (**record keeping**).

What can a commercial beef herd do?

- **Learn to Recognize** Johne's Disease
 - If you never observe a cow or bull with the signs of Johne's Disease you may not have it in your herd; prevention is all that you may want to pursue.
- **Prevent** introduction of Johne's Disease.
 - Be aware of the disease and purchase animals from sellers who are aware of the disease and are attempting to control or eliminate Johne's Disease.
 - Consider **testing** any **replacements** over 20 months of age.
 - Apply management practices to prevent fecal contamination of feed and water.
- **Test your herd** (or a percentage of your herd).
 - Consult your veterinarian to see which test would be best suited to your herd based on incidence, time frame, cost effectiveness, etc.
- **Cull** positive animals in a timely manner.
 - Do not let animals obviously infected continue shedding into and contaminating the environment for the rest of your herd.
 - **Especially** be aware of any potentially affected animals prior to and **during the calving season** where newborn calves, which are most susceptible, could get infected.
- **Cull** any **offspring** of affected animals.
 - There is a high probability that these offspring have become infected either during gestation or at nursing. These offspring could become silent carriers and break with Johne's Disease after they mature.

What should a purebred beef or dairy herd owner consider?

- Value of animals along with production costs in purebred and dairy herds makes Johne's Disease a **more significant** problem in these herds.
- Subclinical Johne's Disease **decreases milk production** as early as the first lactation. (Significant to both dairy and beef herds.)
- Johne's Disease **shortens the productive herd life** of cattle.
- Purebred Beef and Dairy operators will increasingly find it necessary to eliminate this disease **to remain competitive** in the market place.
- **Consult your veterinarian** - Consider adopting a comprehensive Johne's Disease control plan for your herd .
- The United States Animal Health Association has a recommended Johne's Disease Certification Program. A copy of this program is included in this pamphlet. Read it, visit with your veterinarian, and consider starting now.
- **JOHNE'S DISEASE WILL NOT GO AWAY - IT WILL CONTINUE TO CAUSE INCREASING PROBLEMS UNLESS CONCERN AND ACTION ARE TAKEN.**
- Johne's Disease is an economic disease: decreased production = decreased income.

What role will the South Dakota Animal Industry Board play?

- **While control of Johne's Disease is through voluntary participation, the Animal Industry Board will provide help in record keeping and certifying herds.** This will facilitate authenticity to **Herd Plans** and therefore **assist** the industry **in controlling and eliminating Johne's Disease**. Certification of voluntary achievement of herd status will no doubt become **important in the marketing of animals in the future.**

RECOMMENDED SAMPLE COLLECTION TECHNIQUES FOR JOHNES DISEASE HERD TESTING

Note: All samples must be collected by an accredited veterinarian.

Taking Fecal Samples

1. Take precautions to prevent cross contamination when taking samples.
 - Collect the fecal sample directly from the rectum.
 - Use a clean plastic glove for each sample.
 - Keep unused gloves and containers clean.
 - Clean water in a squirt bottle can be used for lube.
2. Fill containers no more than ½ full with feces. **SCREW LIDS DOWN TIGHTLY** to prevent leaking.
3. Mark sample No. and Cow ID on side and lid of samples containers, use a waterproof pen and underline the Sample No.
4. Get samples to Lab fresh for best results (minimizes overgrowth by other organisms in culture). Samples should arrive at the lab within 4 days maximum.
5. If sample must be held until shipping: hold at refrigerator temperature. Freezing samples is not recommended.

Taking Blood Samples

1. Fill clot tubes (red stopper) ½ full at least.
2. Spin and separate serum, or let clot at room temperature. Pour off serum into sterile tubes, check lids for tightness, label properly.

Shipping Samples to the Lab

1. Packing Fecal Samples
 - Let fecal samples “cool” before packing in a mailer.
 - Sort containers by Sample No. –bag in plastic bags- 25-50 per bag.
 - Use insulated mailer.
 - Use ice packs in warm weather.
 - **DOUBLE PLASTIC BAG THE SHIPMENT.**
2. Ship samples to lab.
 - Overnight or two-day shipment is best.
 - The ideal arrival days are Monday or Tuesday.
3. Most properly collected fecal samples, held at cool temps, will be OK for 3-4 days maximum.
4. Shipping Serum Samples
 - Box in order by Sample No.
 - Double plastic bag to prevent leakage in the event of breakage.
 - Use ice packs in warm weather.

Be sure to enclose the completed Laboratory Request Form

NATIONAL PARATUBERCULOSIS CERTIFICATION PROGRAM

1. **Herd definition:**

A group of animals that has been managed as a separate and discrete unit. This may include two or more geographically separated groups of animals under common ownership or supervision but which have an interchange or movement of animals without regard to health status.

2. **Criteria for herds qualified to enter certification program:**

A. The herd has been in existence for at least one year.

OR

The herd was assembled with cattle originating directly from paratuberculosis certified herds only.

B. A herd assembled with cattle originating directly from certified herds only shall start at the lowest certification level of the herds from which the assembled cattle were acquired. A negative first herd test will qualify the newly assembled herd for the next certification level.

3. **Animal Identification:**

A. All animals must have permanent identification other than a plastic ear tag or neck chain.

B. Acceptable means of permanent identification are USDA uniform series eartag (metal tags), electronic ID, registration or association numbers accompanied by identification document, and ear tattoos.

4. **Testing Laboratories:**

All tests for the National Paratuberculosis Certification Program must be performed at an accredited laboratory. Laboratory accreditation will be on the basis of satisfactory performance on an annual check test for serum antibody, *M. paratuberculosis*-detection based tests, or both.

5. **Tests:**

A. **Serum antibody test.**

Any test sufficiently sensitive and specific for detection of antibodies to M.A.P. in bovine serum. Definition of “sufficiently sensitive and specific” will be on the basis of results of performance of a check test and proficiency standards set by the Program. Note: Early in the program it is recommended that the USDA licensed ELISA for M.A.P. be the test of choice.

B. M. paratuberculosis-detection test.

Any test sufficiently sensitive and specific for detection of M.A.P. in bovine fecal samples. Definition of “sufficiently sensitive and specific” will be on the basis of results of performance of a check test and proficiency standards set by the Program. Note: Early in the program it is recommended that fecal culture be the test of choice. Furthermore, fecal culturing should be done at laboratories that have demonstrated proficiency at performing this test.

6. Collection of samples:

All blood and fecal samples are to be collected by, or under the direct supervision of, a licensed accredited veterinarian or a State or Federal animal health official.

7. Veterinary Certification:

The veterinarian performing or supervising the collection of test samples is to certify that the samples collected were from the animals identified on the test documents.

8. Owner/Manager Certification:

- A. At the initial test date; that the herd has been in existence for at least one year or was assembled only from certified herds.
- B. At each test date; a list identifying all animals previously tested but no longer in the herd.
- C. At each test date; that all animals added to the herd since the last herd test were raised in the herd or tested at the time of arrival on the premises (See Herd Additions Addendum to Nat’l PTB Cert. Prog.).
- D. At each test date; a written statement certifying that to the best of his/her knowledge no animals that left the herd tested positive for paratuberculosis or were exhibiting clinical signs of Johne’s disease.

9. Definition of a positive animal:

An animal is defined to be positive, i.e., infected with *Mycobacterium paratuberculosis*, only if M.A.P. is demonstrated by an organism detection test on tissues or feces of the animal.

10. Consequences of identification of a positive animal during a herd test:

Identification of a positive animal during the certification herd test will result in the loss of certification status. The next negative herd test will qualify the herd for Level 1 certification.

11. **Protocol to be followed if an animal is positive by a serum antibody test:**
- A. An animal positive on a serum antibody test must be retested by a M.A.P. detection test as soon as possible, but no more than 45 days after the date the blood was drawn for the serum antibody test.
 - B. The certified herd will maintain its present certification status pending the results of the M.A.P. detection test.
 - C. A negative result on the M.A.P. detection test will allow the herd to move to the next certification level.
 - D. If an animal is removed from the herd while waiting for serum antibody test results, a fecal sample shall be collected and submitted to a laboratory. The sample will be tested for M.A.P. if the antibody test is positive.
 - E. Failure to retest the animal within 45 days will result in loss of certification status. The next negative herd test will qualify the herd for Level 1 certification.
12. **Protocol if an animal sold from a certified herd is identified as positive:**
- A. If an animal sold from a test-negative status herd is identified as positive by an organism detection test within 16 months of the date of sale, selling certified herd shall, within 120 days of being notified, conduct a herd retest of all eligible animals by both the serum antibody and organism detection tests.
 - B. The selling certified herd will maintain its present certification status pending the results of the herd test.
 - C. If the herd retest is negative, the herd will maintain its “present” certification status. The herd owner/manager shall then have the option of maintaining his/her herd test date so that his next herd test is not due until 14 months after the retest.
 - D. If a positive animal is identified on this retest, the selling herd will lose its certification status. The next negative herd test will qualify the herd for Level 1 certification.
13. **For special circumstances or appeals an advisory board will convene to consider the facts and render a final decision.**

U.S. Voluntary Johne's Disease Herd Status Program

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PROGRAM ENTRY --- STANDARD TRACK

1. ELISA test on 30 animals 36 months and older.
2. If Negative, Level 1 status, apply to Animal Industry Board.
3. If a positive ELISA test animal, fecal culture animal within 45 days of ELISA test positive. If culture-negative, apply for Level 1 status.
4. To advance to level 2, ELISA test on a statistical subset of animals 36 months or older (if 500 or less cows, ELISA test cows), 10-14 months after Level 1 testing.
5. If test Negative, Level 2 status, or fecal culture any ELISA positives as in Item 3.
6. To advance to Level 3, fecal culture a statistical subset of 36 months or older cows and all bulls 24 months or older (if 300 or less cattle, fecal culture all) 10-14 months after Level 2 testing.
7. If culture Negative, Level 3 status, or if a culture-positive, revert to an infected herd and start over to gain Level 1 status.
8. To advance to Level 4, ELISA test on a statistical subset of 36 months or older animals (if 500 or less cows, ELISA test all cows) 10-14 months after Level 1 testing.
9. If Negative, Level 4 status, or fecal culture any ELISA positives as in Item 3.

<p>You may elect to stay at any status Level achieved by annual herd monitoring using the ELISA test on 30 cows 36 months old or older.</p>

<p>The interval between tests is 10 to 14 months, except for confirmatory testing which is done within 45 days.</p>

PROGRAM ENTRY --- FAST TRACK

1. Herd owner must submit a signed statement that:
 - a) I am fully aware of the management and disease history of the herd and the property during the past five years.
 - b) Johne's Disease is not known or suspected to have existed in the herd for the past five years or on the property during the past twelve months.
 - c) Cattle are not known to have been introduced from known infected herds or unknown status during the past five years.
 - d) The herd veterinarian of record must co-sign the owner statement.
2. Entry is Level 2 status. ELISA test a statistical subset of 36 months or older animals (if 500 or less cows, ELISA test all).
3. If test Negative, Level 2 status, apply to Animal Industry Board.
4. If a positive ELISA test animal, fecal culture animal within 45 days of ELISA test positive. If culture-Negative, apply for Level 2 status.
5. To advance to Level 3, fecal culture 30 cows 36 months or older and all bulls 2 years or older 10-14 months after Level 2 testing.
6. If culture-Negative, Level 3 status, or if a culture-positive, revert to an infected herd and start over to gain Level 1 status.
7. To advance to Level 4, ELISA test a statistical subset 36 months old or older cows (if 500 or less cows, ELISA test all cows) 10-14 months after Level 3 testing.
8. If test negative, Level 4 status, or fecal culture any ELISA positive as in Item 4.

ONLY NEGATIVE RESULTS ON ALL TESTS ON ALL SAMPLES WILL ALLOW THE HERD TO ADVANCE OR RETAIN IT'S PROGRAM LEVEL.

Herd Additions

1. Purchased heifers and bulls less than 2 years of age may be added to the herd, provided that:

- **Levels 1 & 2**

- The animal was purchased from a herd with a test-negative level that is equal to or higher than the herd it is entering.

OR

- The purchased animal is tested with an organism detection test (fecal sample) in the next herd test after it reaches 24 months of age. The herd will not lose its status if additions that are test positive are removed from the herd within 30 days after the positive test along with any progeny and have a follow up epidemiological study by the State's Designated Johne's Coordinator. The addition animal reaches herd status and becomes part of the herd after a negative test result on the herd test.

- **Test Negative Level 3 & 4 Herds**

- The animal was purchased from a herd with a test-negative level that is equal to or higher than the herd it is entering

OR

- The purchased animal is from a herd 1 level below the status of the purchasing herd and is tested with an official test at 12, 18, and 24 months of age and is tested in the next herd test after it reaches 2 years of age. The herd will not lose its status if additions that are test positive are removed from the herd within 30 days after the positive test along with any progeny and have a follow up epidemiologic study by the DJC. The addition animal reaches herd status and becomes part of the herd after a negative test result on the herd test.

OR

- If the addition is more than one level below the herd's current status, the herd will be demoted one status level and the addition(s) must be tested with an official test at 12, 18, and 24 months of age and is tested in the next herd test after it reaches 2 years of age. The herd will not lose its status if additions that are test positive are removed from the herd within 30 days after the positive test along with any progeny and have a follow up epidemiologic study by the DJC. The addition animal reaches herd status and becomes part of the herd after a negative test result on the herd test. Subsequently, the herd may advance in the status program by following the testing protocol for that level.

2. Purchased or replacement animals 2 years of age or older may be added to the herd provided that:

- **Test Negative Level 1 & 2 Herds**

- The animal was purchased from a herd with a test-negative level equal to or higher than the herd it is entering

OR

- The animal has a screening test within 30 days before entering the test negative level herd with negative results, **AND**
- Fecal samples for an official Johne's disease test have been collected from each animal added and submitted between 30 days before and 30 days after arrival. The herd will not lose its status if additions that are test positive are removed from the herd within 30 days after arrival, along with any progeny, **AND**
- The herd addition is tested on the next herd test. The addition's status will remain at its entry level until it has tested negative at the next herd test.

- **Test-Negative Level 3 & 4 Herds**

- The animal was purchased from a herd with a test-negative level that is equal to or higher than the herd it is entering

OR

- The herd of origin has a test-negative level of 1 level below and the purchased addition has a screening test with negative results within 30 days before entry into the program herd, **AND**
- Fecal samples for an organism detection test have been collected from each animal added and submitted between 30 days before and 30 days after arrival. The herd will not lose its status if additions that are test positive are removed from the herd within 30 days after arrival, along with any progeny, **AND**
- The herd addition is tested on the next herd test. The addition's status will remain at its entry level until it has tested negative at the next herd test;

OR

- If the addition is more than one level below the herd's current status, the herd will be demoted one level, **AND**
- Each addition must have an official test on fecal samples between 30 days before and 30 days after arrival. The herd will not lose its status if additions that are positive are removed from the herd within 30 days after arrival along with any progeny, **AND**
- The herd addition is tested on the next herd test. The addition's status will remain at its entry level until it has tested negative at the next herd test. Subsequently, the herd may advance in the status program by following the testing protocol for that level.

RECOMMENDED HERD MANAGEMENT PRACTICES

INTRODUCTION

Mycobacterium avian subspecies *paratuberculosis* (M.A.P.) can infect and cause disease in a variety of domesticated, wild and exotic species of ruminants. In order to allow for the introduction of outside genetics to a herd, but minimize the risk of introducing paratuberculosis into a certified herd from outside sources, the following management practices are recommended.

HERD ADDITIONS

There is a high risk of introducing paratuberculosis into a herd from herds of unknown status. Consequently, totally closed herds are recommended. If cattle are to be introduced into a certified herd, they should be obtained from a herd of equal or higher paratuberculosis certification level. If cattle from other than a certified herd of equal or higher status are bought, leased or returned to the farm, upon arrival at the certified herd, it is recommended that the animal be kept in isolation from animals less than 1 year of age. Follow the testing guidelines in the Standard Track section.

SEMEN

The risk of transmission of paratuberculosis through semen is low. However, M.A.P. can be shed in the semen of infected bulls that are showing clinical signs of Johne's disease. Therefore, it is recommended that semen from bulls with clinical signs of Johne's disease not be used.

EMBRYOS

The greatest potential for transmission of paratuberculosis through embryo transfer is by the use of recipients of unknown paratuberculosis status. An infected recipient can contaminate pastures and calving pens with M.A.P. and transmit the infection to the calf which it carries. Only cattle within the certified herd or from a herd of equal or higher paratuberculosis certification level should be used as embryo recipients. The risk of transmission of paratuberculosis by the embryo itself is theoretically possible, but not probable. The transfer of embryos from cows with clinical signs of paratuberculosis represents a low risk of transmission, however, it is not recommended.

WILD RUMINANTS

Exposure to wild ruminants on public and private land should be avoided to the extent possible.

COMMINGLING

A certified herd should not be commingled with or grazed behind sheep, goats, or commercially raised deer, elk or bison.

FENCE LINE CONTACT

Fence line contact with animals of unknown paratuberculosis status presents a low risk of exposure to M.A.P.. However, it should be avoided when possible.